

1                   **Multi-Joint Wrench**

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3                   **Field of Invention**

4     The present invention relates to a multi-joint wrench.

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6                   **Background of Invention**

7     Taiwanese Patent Publication No. 135392 discloses a wrench including a  
8     head 10 and a handle 20. The head 10 includes an ear 11. The handle  
9     20 includes two ears 21 between which the ear 11 is put. A bolt 24 is  
10    driven into a hole 23 defined in one of the ears 21, a hole 131 defined in  
11    the ear 11 and a hole 231 defined in the remaining one of the ears 21.  
12    Thus, the head 10 is pivotally connected with the handle 20, i.e., this  
13    conventional wrench can be bent. This conventional wrench can  
14    therefore be used in space that is limited and slightly bent; however, it  
15    cannot be operated in limited and crooked space.

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17    The present invention is therefore intended to obviate or at least alleviate  
18    the problems encountered in prior art.

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20                   **Summary of Invention**

21    The primary objective of the present invention is to provide a wrench  
22    including a configuration that can adapt to limited and crooked space.

23

24    According to the present invention, a wrench includes a head, a first  
25    handle, a second handle and a retaining device. The first includes first  
26    and second end. The first end of the first handle is pivotally connected

1 with the head about a first axis. The second handle is pivotally  
2 connected with the second end of the first handle about a second axis.  
3 The retaining device can retain the first handle in position relative to the  
4 head, and the second handle in position relative to the first handle.

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6 Other objects, advantages, and novel features of the invention will  
7 become more apparent from the following detailed description when  
8 taken in conjunction with the attached drawings.

9

10 **Brief Description of Drawings**

11 The present invention will be described through detailed illustration of  
12 the preferred embodiment referring to the drawings.

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14 Figure 1 is a perspective view of a wrench according to the preferred  
15 embodiment of the present invention.

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17 Figure 2 is an exploded view of the wrench shown in Figure 1.

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19 Figure 3 is a cross-sectional view of the wrench of Figure 1.

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21 Figure 4 is similar to Figure 3 but showing the wrench in another  
22 position.

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24 Figure 5 is a side view of the wrench of Figure 1.

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26 **Detailed Description of Preferred Embodiment**

1 Referring to Figure 1, according to the preferred embodiment of the  
2 present invention, a wrench 10 includes a head 20, a first handle 30  
3 pivotally connected with the head 20 about a first axis and a second  
4 handle 40 pivotally connected with the first handle 30 about a second axis.  
5 The first and second axes are parallel to each other or not. A retaining  
6 device 50 can retain the first handle 30 in position relative to the head 20,  
7 and the second handle 40 in position relative to the first handle 30.

8

9 Referring to Figure 2, the head 20 includes an annular portion in which an  
10 annular gear 21 is put. A mechanism (not shown) is arranged between  
11 the annular portion of the head 20 and the annular gear 21 so that the head  
12 20 can drive the annular gear 21 in selective one of two directions.

13

14 The head 20 includes an ear 22 formed thereon. An aperture 23 is  
15 defined in the ear 22. The first handle 30 includes two ears 31 formed at  
16 a first end. An aperture 32 is defined in each of the ears 31. A pin 33  
17 is fit in the apertures 32 and 23, thus pivotally connecting the first handle  
18 30 with the head 20.

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20 The first handle 30 includes two ears 35 formed at a second end. An  
21 aperture 36 is defined in each of the ears 35. The second handle 40  
22 includes an ear 41 formed at a first end. An aperture 42 is defined in the  
23 ear 41. A pin 39 is fit in the apertures 36 and 42, thus pivotally  
24 connecting the second handle 40 with the first handle 30.

25

26 The ear 22 includes a plurality of teeth 24 formed thereon. The ear 41

1 includes a plurality of teeth 43 formed thereon. The retaining device 50  
2 includes first and second detents 52 movably attached to the first handle  
3 30. The first detent 52 can be engaged with the teeth 24 so as to retain  
4 the head 20 in position relative to the first handle 30. The second detent  
5 52 can be engaged with the teeth 43 so as to retain the second handle 40  
6 in position relative to the first handle 30.

7

8 The first handle 30 defines first and second detent-receiving holes 34.  
9 Each of the detent-receiving holes 34 receives a ball 55, a spring 54 and  
10 one of the detents 52. Each of the detents 52 includes a tooth 521  
11 formed at an end for engagement with the teeth 24 or 43 and a recess 522  
12 defined in an opposite end for receiving one of the springs 54.

13

14 The first handle 30 defines a switch-receiving hole 38 through which the  
15 first detent-receiving hole 34 is communicated with the second  
16 detent-receiving hole 34. A switch 51 is put in the switch-receiving hole  
17 38. The switch 51 is in the form of a rod. The switch 51 defines first  
18 and second annular grooves 511 and 512 selective one of which receives  
19 the balls 55. The first annular groove 511 is deeper than the second  
20 annular groove 512.

21

22 Referring to Figure 3, the second annular groove 512 receives the balls 55  
23 so that the balls 55 abut the second ends of the detents 52. The tooth  
24 521 of the first detent 52 is firmly engaged with the teeth 24 so as to  
25 retain the head 20 in position relative to the first handle 30. The tooth  
26 521 of the second detent 52 is firmly engaged with the teeth 43 so as to

1 retain the second handle 40 in position relative to the first handle 30.

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3 Referring to Figure 4, the first annular groove 511 receives the balls 55 so  
4 that the balls 55 stay away from the second ends of the detents 52. The  
5 tooth 521 of the second detent 52 can be disengaged from the teeth 43 so  
6 as to allow pivotal of the second handle 40 in position relative to the first  
7 handle 30.

8

9 Referring to Figure 5, the first annular groove 511 receives the balls 55 so  
10 that the balls 55 stay away from the second ends of the detents 52. The  
11 tooth 521 of the first detent 52 can be disengaged from the teeth 24 so as  
12 to allow pivotal of the head 20 in position relative to the first handle 30.

13

14 Another head 44 is pivotally connected with the second handle 40. To  
15 this end, the second handle 40 includes two ears (not numbered) at a  
16 second end, and the head 44 includes an ear (not numbered) put between  
17 the ears formed at the second end of the second handle 40. An aperture  
18 (not numbered) is defined in each of the ears formed at the second end of  
19 the second handle 40. An aperture (not numbered) is defined in the ear  
20 of the head 44. A pin (not numbered) is fit in the apertures defined in  
21 the ears formed at the second end of the second handle 40 and the  
22 aperture defined in the ear of the head 44, thus pivotally connecting the  
23 head 44 with the second handle 40.

24

25 The present invention has been described through detailed illustration of  
26 the preferred embodiment. Those skilled in the art can derive variations

1 from the preferred embodiment without departing from the scope of the  
2 present invention. Therefore, the preferred embodiment shall not limit  
3 the scope of the present invention defined in the claims.